

PATENT ABSTRACTS OF JAPAN

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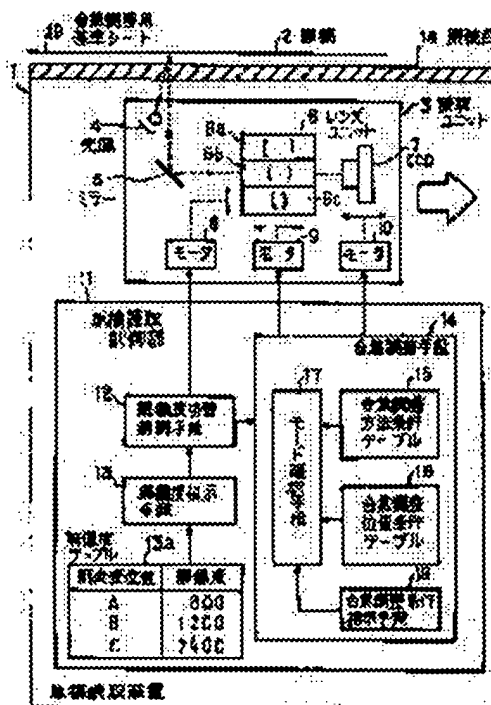
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(54) DOCUMENT READER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a document reader which can read a document at a proper speed with proper quality corresponding to the use environment.

SOLUTION: The document reader which adjusts focusing by controlling an optical system including lenses from a document surface to an image pickup element is enabled to read a document at a speed with quality suitable to the use environment by diversifying the contents of a normally provided optical system focusing adjusting function into automatic adjustment, adjustment using default values set previously in the reader, and manual adjustment and making it possible to make a choice according to the mode. For example, when a screen read area on a document platen 1a is sectioned and different-resolution reads are made by the sections, resolutions and sub-scanning positions where the reader is switched to the resolutions are set in a resolution table 13a and a focusing adjusting means 14 adjusts the focusing at the resolution switching control positions based upon the document read start time and the settings in the resolution table 13.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to amelioration of the focus adjustment function in the manuscript reader equipped with the device in which resolution can be changed especially optically, about manuscript readers, such as an image scanner for inputting the image information of a manuscript side.

[0002]

[Description of the Prior Art] Drawing 5 shows the structure of the manuscript reader of the conventional common flatbed mold, and, for a transparent manuscript base, a reading unit with 2 [movable / a manuscript and 3 / in the direction of an arrow (the direction of vertical scanning is shown)], and 4, as for a mirror and 6', the light source and 5 are [1a / a lens and 7] CCD substrates (solid state image pickup device).

[0003] The field of the manuscript 2 carried on manuscript base 1a is irradiated by the light source 4 of the reading unit 3. The light vertically reflected from the field of a manuscript 2 is bent by the right angle by the mirror 5, passes along lens 6', reaches the CCD substrate 7, and is changed into an electrical signal. The optical read resolution of a manuscript is decided by the focal distance of lens 6'. Although a scale factor becomes large and resolution goes up so that the lens of a long focus is used, the fractionation angle becomes narrow and the size of the main scanning direction which reads a manuscript becomes small.

[0004] The conventional manuscript reader had many things of a single focal lens method which used only one lens, and had the thing of the lens change method using two lenses of a focus which is different in a part. Moreover, in a copying machine, there was a thing of the zoom lens method which can carry out continuation change of a scale factor, i.e., the resolution, using a zoom lens.

[0005] (a) of drawing 6, (b), and (c) are the things illustrating these all directions types, and (a) of drawing 6 shows a single focal lens method, the field angle alpha of a lens is immobilization and they become fixed [the magnitude of the horizontal-scanning range which reads a manuscript].

[0006] (b) of drawing 6 is the field angle alpha 1 in the case of being the example of a lens change method and using a lens with a focal distance of f:75mm. Field angle alpha 2 at the time of using an f:115mm lens It can choose. Field angle alpha 1 The resolution of 800dpi is then obtained and it is the field angle alpha 2. The resolution of 2400dpi is then obtained.

[0007] (c) of drawing 6 is the example of a zoom lens method, and can carry out continuation change of the resolution from 800dpi to 2400dpi by changing a zoom ratio.

[0008] Thus, although it was impossible to have changed resolution optically, and interpolation processing could not but raise resolution in the manuscript reader by the conventional single focal lens method when required, compared with the optical approach, the problem was in image quality.

[0009] Moreover, in the manuscript reader of the conventional lens change method, although the lens group is held in one unit, the lens unit could be moved no longer only to one directions, such as a perpendicular direction, to the optical path because of the lens

change. On the other hand, the locations where the lens with which focal distances differ is inserted into an optical path differ as shown in (b) of drawing 6 . And since it was necessary to evacuate so that the field angle of a lens in use may not be interrupted, the excessive tooth space was generated to the lens unit, and the lens which is not used had the problem that equipment size became large. Since there was furthermore only a migration means for a lens change in a lens unit, with the lens of high resolution with shallow copy community depth and depth of focus, there was a problem of being easy to be influenced of environmental variations, such as a float of a manuscript and temperature.

[0010] Moreover, in the case of a zoom lens method, when it was going to realize high resolution by little aberration, there was a problem that the cost of a lens became very high.

[0011] Then, in the patent application "Japanese Patent Application No. No. 163704 [nine to]" of the point by these people, in order to realize wide range resolution in high degree of accuracy and a compact more cheaply, it had a lens unit containing two or more lenses corresponding to two or more different resolution, and invention of a manuscript reader it was made to move selectively one lens corresponding to the resolution as which it was instructed in this lens unit into an optical path was shown.

[0012] Drawing 7 explains the principle. As for a lens unit and 109, 108 are [an image side and 110] image formation sides among drawing. Drawing arranges to the lens unit 108 currently illustrated up and down, and three sorts of lenses, resolution 1, resolution 2, and resolution 3, are held in it. The magnitude of the resolution of each lens serves as order of the resolution $3 > \text{resolution } 1 > \text{resolution } 2$.

[0013] The lens unit 108 is moved in the direction of an optical axis at right and left so that image formation of the image of the image side 109 may be correctly carried out to the image formation side 110 with the lens, while being moved to the upper part of drawing, or a lower part so that the lens corresponding to the specified resolution may be inserted into an optical path. Thereby, at the time of reading by resolution 2, the lens unit 108 will be in the condition that are in the location of the method of the rightmost of the optical-axis directional movement range, and the lens of the middle was inserted into the optical path. Moreover, at the time of reading by resolution 3, it is moved to the location by the side of the leftmost of the optical-axis directional movement range, and the lens unit 108 will be in the condition that the lens of the lower berth was inserted into the optical path. And at the time of reading by resolution 1, the lens unit 108 is in the middle predetermined location of the optical-axis directional movement range, and will be in the condition that the lens of an upper case was inserted into the optical path. Thus, a focus is benefited for the optimal positioning of the lens in the inside of an optical path with the change of the lens according to resolution, and the field angle corresponding to resolution is set up.

[0014] Moreover, although the graphic display abbreviation is carried out, the CCD substrate put on the image formation side 110 is also made movable in the direction of an optical axis, and can adjust a scale factor and a focusing point to high degree of accuracy more by changing the optical path length from a manuscript side or a lens to CCD.

[0015] Drawing 8 shows one example of the reading unit in the manuscript reader based on the principle shown in drawing 7 . (b of (a) of drawing 8) of the development view and drawing 8 is an outline sectional view.

[0016] In (a) of drawing 8 , the optical unit 115 and the optical unit 126 are mounted in the mainframe 111 of a reading unit. The lens unit 121 is mounted in the optical unit 115, and the CCD substrate 127 is mounted in the optical unit 126.

[0017] The mainframe 111 is equipped with the mirrors 112a, 112b, and 112c for bending an optical path, the holes 113a-113c for holding the guide shafts 116a and 116b of the optical unit 115, and the guide sleeves 114a and 114b guided when moving a reading unit by vertical scanning.

[0018] The optical unit 115 is equipped with the holes 117a and 117b for holding the guide shafts 116a and 116b and the guide shaft 125 of the lens unit 121, the motor 118 for moving the optical unit 115 forward and backward within a main frame 111 and a belt 119, and the apertures 120a and 120b for making light give off ON to the lens of the lens unit 121.

[0019] The lens unit 121 is equipped with three lenses 122a, 122b, and 122c, the motors 123 for making it move at right angles to an optical path within the optical unit 115 and belts 124, and guide shafts 125.

[0020] The optical unit 126 is equipped with the CCD substrate 127 attached in the tooth back, the aperture 128 for an optical input which was made to counter aperture 120b of the optical unit 115, and was prepared, the guide sleeve 129 and guide rail 130 with which it is equipped with the guide shafts 116a and 116b of the optical unit 115, respectively, and the motor 131 and belt 132 for moving the optical unit 126 forward and backward.

[0021] (b) of drawing 8 shows the condition that the above-mentioned optical unit 115 of (a) of drawing 8 , the lens unit 121, the optical unit 126, and the CCD substrate 127 are mounted in the mainframe 111, respectively in the cross section.

[0022]

[Problem(s) to be Solved by the Invention] Although invention of previous patent application "Japanese Patent Application No. No. 163704 [nine to]" enabled it to perform manuscript read of high quality easily in wide range resolution as mentioned above, improvement in still much more read quality is demanded. moreover -- another side -- read quality -- or a read rate may be thought as important and the actual utilization environment of a manuscript reader is more various than read quality.

[0023] This invention aims at offering the manuscript reader in which the manuscript read in the suitable read quality and the suitable read rate according to a utilization environment is possible.

[0024]

[Means for Solving the Problem] This invention is made selectable with the mode while it diversifies the content of the focus adjustment function with which the manuscript reader is usually equipped, and it makes possible read and according to quality and read rate manuscript read suitable for a utilization environment.

[0025] The manuscript reader by this invention is constituted as follows.

(1) The configuration which formed two or more selectable adjustment modes in which focus adjustment was performed on different conditions in the manuscript reader which controls the optical system containing the lens from a manuscript side to an image sensor, and performs focus adjustment.

(2) The configuration in which the focus of optical system is adjusted to the conditions from which two or more selectable adjustment modes differ in the preceding clause (1)

using the default which carries out regulating automatically or is beforehand set up in equipment, or the focus adjustment approach conditions of ** are included.

(3) The configuration in which adjustment by the manual is further included in focus adjustment conditions in the preceding clause (2).

(4) The configuration in which the location which performs focus adjustment is made into the criteria location of immobilization, or is detected automatically on the conditions from which two or more selectable adjustment modes differ in respect of a manuscript, or the focus adjustment position conditions of ** are included on them in the preceding clause (1) thru/or (3).

(5) The configuration in which what is made into the location which specified beforehand the location which performs focus adjustment further as focus adjustment position conditions in the preceding clause (4) is contained.

(6) Two or more optical units which are optical units for carrying out image formation of the image of a manuscript to the light source which irradiates a manuscript, and correspond to two or more different resolution, The resolution change control means which moves selectively one optical unit corresponding to the resolution as which it was instructed in these two or more optical units into an optical path, It is the configuration of having a focus adjustment means to control the optical system containing an optical unit and to adjust a focus, and having two or more selectable adjustment modes in which the way the above-mentioned focus adjustment means differ performs focus adjustment.

(7) It is the configuration that a focus adjustment means has an adjustment mode selection means to choose adjustment mode as behind, in the preceding clause (6) before directing initiation of manuscript read, and the selected adjustment mode was made to perform focus adjustment.

(8) It is the configuration which is that to which one of the adjustment modes performs focus adjustment in the preceding clause (6) or (7) in the datum level of equipment.

(9) It is the configuration which is what one of the adjustment modes detects beforehand the location which performs focus adjustment in a manuscript in the preceding clause (6) or (7), and performs focus adjustment in the detected location.

(10) One of the adjustment modes is a configuration which is what performs focus adjustment in the location where the detection location of a manuscript or arbitration was directed in the preceding clause (6) or (7).

(11) It is the configuration of having a datum-level focus directions means to direct focus adjustment in the datum level of this equipment in order to perform focus adjustment by the amendment function in which a focus adjustment means performs focus adjustment in the preceding clause (8) in the datum level of equipment.

(12) It is the configuration of having a datum-level focus adjustment value maintenance means to hold the focus adjustment value of the equipment datum level called for beforehand in order to perform focus adjustment by the amendment function in which a focus adjustment means performs focus adjustment in the preceding clause (8) in the datum level of equipment.

(13) A focus adjustment means is the configuration of having a focus-among manuscript adjustment position directions means to direct the focus adjustment position in a manuscript in order to perform focus adjustment by the adjustment mode in which focus adjustment is performed in the location where arbitration was directed in the preceding clause (10).

(14) It is the configuration which is what one of the adjustment modes has an adjustment value directions means to direct the adjustment value for the focus of an optical unit, in the preceding clause (6) or (7), and performs focus adjustment of an optical unit with the this directed adjustment value.

(15) It is the configuration of being the thing one of the adjustment modes has a focus adjustment value maintenance means to hold the focus adjustment value calculated by former manuscript read, and a focus adjustment means to direct focus adjustment using the this held focus adjustment value, in the preceding clause (6) or (7), and carry out focus adjustment by the this directed focus adjustment value.

(16) The configuration which performs manuscript read in the preceding clause (8) immediately after focus adjusting in equipment datum level.

(17) The configuration which detected the location for performing focus adjustment in a manuscript after focus adjusting in equipment datum level, and was made to perform manuscript read in the preceding clause (8) after performing focus adjustment in the this detected location.

(18) The configuration which performs focus adjustment in the preceding clause (8) in the location where it was directed in [after focus adjusting in equipment datum level] the manuscript, and was made to perform read of a manuscript after that.

(19) The configuration which performs focus adjustment in the preceding clause (12) using the focus adjustment value of the held equipment datum level, and was made to perform read of a manuscript after that.

(20) The configuration which detected the location which performs focus adjustment in a manuscript, performs focus adjustment using the focus adjustment value in the equipment datum level currently held, and was made to perform read of a manuscript in the this detected location after that in the preceding clause (12).

(21) The configuration which performs focus adjustment in the location where it was directed in the manuscript in the preceding clause (12) using the focus adjustment value in the equipment datum level currently held, and was made to perform read of a manuscript after that.

(22) The configuration which detected the location which performs focus adjustment with the focus adjustment value calculated by the read before holding in the preceding clause (15), and then performs focus adjustment in a manuscript, performs focus adjustment further in the this detected location, and was made to perform read of a manuscript after that.

(23) The configuration which performs focus adjustment with the focus adjustment value calculated by the read before holding in the preceding clause (15), performs focus adjustment in the location where it was directed in the manuscript next, and was made to perform read of a manuscript after that.

(24) The configuration which was made to perform read of a manuscript after the focus adjustment value calculated by the read before holding in the preceding clause (15) performed focus adjustment.

[0026] Drawing 1 explains the basic configuration of this invention.

[0027] In drawing 1 , 1 is the manuscript reader constituted by this invention.

[0028] 1a is the manuscript base made with transparent glass etc.

[0029] 2 is a manuscript for read.

[0030] 3 is a reading unit, and in the example of a graphic display, it is moved in the

direction of a void arrow head, and it carries out vertical scanning of the manuscript 2.

[0031] 4 is the light source and illuminates the underside of a manuscript 2.

[0032] 5 is a mirror and is for bending the optical path of the reflected light from a manuscript 2.

[0033] 6 is a lens unit and consists of two or more lenses with which resolution differs.

[0034] 6a is a lens for low resolutions.

[0035] 6b is a lens for inside resolution.

[0036] 6c is a lens for high resolutions.

[0037] 7 is the CCD substrate of an image sensor.

[0038] 8 is a motor for a resolution change, is driven in the direction which intersects perpendicularly with the optical path which shows the lens unit 6 by the arrow, and moves the lens of one resolution of arbitration into an optical path.

[0039] 9 is a motor for focus adjustment and is driven in the direction of an optical axis which shows the lens unit 6 by the arrow.

[0040] 10 is a motor for focus adjustment and is driven in the direction of an optical axis which shows the CCD substrate 7 by the arrow.

[0041] 11 is a manuscript reading control section, controls the reading unit 3 etc. and performs manuscript read.

[0042] 12 is a resolution change control means, suspends vertical scanning, and drives a motor 8, and the lens in the lens unit 6 corresponding to the directed resolution is inserted into an optical path.

[0043] 13 is a resolution directions means, and when the vertical-scanning location where vertical scanning should change resolution is arrived at, it directs the change of resolution to the resolution change control means 12.

[0044] 13a is a resolution table, in the image reading field on manuscript base 1a, matches and holds the vertical-scanning location which should change resolution, and resolution, and is referred by the resolution directions means 13.

[0045] 14 is a focus adjustment means, about the lens newly inserted into the optical path by the resolution change by the resolution change control means 12, controls motors 9 and 10 by predetermined conditions, and performs focus adjustment.

[0046] 15 is the focus adjustment approach condition table, focus adjustment is performed using the default which performs automatic focus adjustment by the autofocus device which is not illustrated, or is beforehand set up in equipment, or the control information of whether a manual performs focus adjustment or focus adjustment is performed using the adjustment value in the last manuscript read, and each selectable focus adjustment approach conditions is held.

[0047] 16 holds the control information of whether it carries out in the location of the criteria which detected automatically the location conditions which are a focus adjustment-position condition table and perform focus adjustment on manuscript base 1a, for example, the location where an automatic focus is easy to be obtained according to an autofocus device, on the manuscript side, and performed them, or were beforehand set up in equipment or it carries out in the location which a user specified, and each selectable location conditions.

[0048] 17 is an adjustment mode selection means, carries out parameter assignment of the conditions of each arbitration about the focus adjustment approach conditions and focus adjustment position conditions, and chooses the adjustment mode of focus adjustment.

[0049] 18 is a focus adjustment condition directions means, and performs the input of the parameter which directs the focus adjustment conditions in the adjustment mode which should be chosen, the input of the assignment value of manual adjustment, etc. to the adjustment mode selection means 17.

[0050] 19 is a criteria sheet for focus adjustment, for example, it is prepared in the location on manuscript base 1a corresponding to the home position of the reading unit 3, and the pattern which makes the automatic focus by the autofocus device easy is printed by the underside.

[0051] In actuation of the manuscript reader 1 of drawing 1, the image reading field on manuscript base 1a is classified, and resolution and the vertical-scanning location changed to the resolution are set as resolution table 13a to perform read in different resolution for every field of each partition.

[0052] Drawing 2 shows the example of the manuscript read by such two or more different resolution. In drawing 2, the manuscripts 2a-2e of the small size of five sheets are laid in manuscript base 1a. A resolution change is blocked and (or the change point setting out) directed in the direction of vertical scanning. In the example of a graphic display, the resolution of 800dpi shall be directed to 2400dpi and manuscript 2e of the 4th block to 1200dpi and 2d of manuscripts of the 3rd block to 800dpi and manuscript 2c of the 2nd block, respectively to manuscript 2a of a head block, and 2b. These directions are set as resolution table 13a of drawing 1.

[0053] Similarly, the adjustment mode which should be performed at the time of focus adjustment is set to the focus adjustment means 14 of drawing 1. When there is no setting out, the default defined beforehand is chosen.

[0054] In drawing 1, the focus adjustment means 14 is started at the time of initiation of manuscript read, and the resolution change control based on setting out of resolution table 13a, and focus adjustment is performed by the adjustment mode chosen beforehand or the adjustment mode of a default.

[0055] Although it reads since the method of making the automatic focus by the autofocus device perform can make high degree of accuracy focus most, and quality becomes good about the conditions of the focus adjustment approach in adjustment mode, since a focus takes time amount, a read rate becomes slow. On the other hand, since focus precision becomes low, the approach by manual adjustment is read, and quality worsens. However, since it is adjusted simply, the time amount which a focus takes becomes short. Moreover, the almost in-between result in the case of being based on the case where the read quality and the read rate which are obtained by the approach of making it focus using the default in equipment are depended autofocus, and manual adjustment is obtained.

[0056] About the conditions of a focus adjustment position, the read quality of the approach of detecting a focus adjustment position automatically more autofocus and the approach a user specifies a location is high, and the read quality of the approach using fixed values, such as a fixed adjustment value in equipment, becomes a little low. Moreover, a read rate has the inclination to appear in the form inversely proportional to read quality.

[0057]

[Embodiment of the Invention] Drawing 3 shows the details configuration about the gestalt of 1 operation of the focus adjustment means 14 in drawing 1. The means of each

block in drawing is realized by the program, respectively.

[0058] In drawing 3 , 21 is a condition directions means in a reading preceding paragraph story. The read area assignment on manuscript base 1a of drawing 1 , The image amendment parameter assignment for performing gradation amendment to the manuscript of a photograph or an alphabetic character image etc., and assignment of the read lens corresponding to optical resolution, It has the read resolution assignment containing interpolation resolution, the read quality parameter assignment by the focus adjustment approach conditions and focus adjustment position conditions, and each function of read initiation directions.

[0059] 22 is the image acquisition means of a criteria sheet, and performs read of the datum-level image of the criteria sheet 19 for focus adjustment of drawing 1 .

[0060] 23 is a fixed focus adjustment means in equipment, and it makes focus adjustment of the lens unit 6 perform in the datum level of the criteria sheet 19 for focus adjustment, or the detection location in a manuscript in order to acquire the fixed adjustment value in equipment beforehand.

[0061] 24 is a focus location detection means on a manuscript, and consists of image acquisition means 24a, focus location detection means 24b, and migration means 24c. The property of a manuscript image of having read by image acquisition means 24a, and having read and read the manuscript image in area is analyzed by focus location detection means 24b, a focus adjustment position is detected, and the reading unit 3 is moved to the detected location by migration means 24c.

[0062] 25 is a focus adjustment means in a read manuscript, and realizes focus adjustment of optical system in the focus adjustment position on the manuscript which the focus location detection means 24 on a manuscript detected.

[0063] 26 makes the focus [value / which are the maintenance fixed focus value setting-out means in equipment, and equipment acquired beforehand / the focus location in a manuscript and focus adjustment value] adjustment using setting out and these values perform.

[0064] 27 is a manual focus location directions means, holds the adjustment position in the case of focusing by the manual, and directs the location.

[0065] 28 is the last focus location directions means, holds the adjustment position used for the focus by the last manuscript read, and directs the location.

[0066] 29 moves the reading unit 3 to the location in a manuscript which is a migration means to an adjustment position and was detected beforehand, or the specified location in a manuscript.

[0067] 30 is this scan / press can means, and performs manuscript read after focus adjustment.

[0068] In addition, number (1) - (10) shown in drawing 3 expresses the class in selected adjustment mode, and shows a detail to drawing 4 R> 4.

[0069] Drawing 4 shows the assignment menu of a reading quality parameter assignment function within the condition directions means 21 in the reading preceding paragraph story of drawing 3 , and the response with adjustment mode (1) - (10). An assignment menu is expressed with the combination of the menu of the focus adjustment approach conditions, and the menu of focus adjustment position conditions.

[0070] Adjustment C:manual adjustment D by the activity of the fixed adjustment value in regulating B:equipment the menu of the focus adjustment approach conditions consists

of A, B, following C, and following D, and according to an A:autofocus unit: The menu of the adjustment focus adjustment position conditions by the adjustment value at the time of read consists of a, following b, and following c last time.

[0071] a: Un-detecting (a focus adjustment position is not detected).

b: the activity of the location detection c:user specified location using an autofocus unit -- one adjustment mode is determined by choosing one condition at a time in each of two menus of these. For example, adjustment mode will be set to (2) if regulating automatically by the autofocus unit of A and the location detection using the autofocus unit of b are specified with a menu.

[0072]

[Effect of the Invention] As mentioned above, since this invention can choose focus adjustment conditions in response to the various demands from the user to each of the read quality in a manuscript reader, and a read rate, the read engine performance of equipment can be made to be always able to respond to a utilization environment, it can be made to operate, and the good manuscript reader won using low cost can be realized.

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CLAIMS

[Claim(s)]

[Claim 1] The manuscript reader characterized by forming two or more selectable adjustment modes in which focus adjustment is performed on different conditions in the manuscript reader which controls the optical system containing the lens from a manuscript side to an image sensor, and performs focus adjustment.

[Claim 2] The manuscript reader characterized by adjusting the focus of optical system to the conditions from which two or more selectable adjustment modes differ in claim 1 using the default which carries out regulating automatically or is beforehand set up in equipment, or including the focus adjustment approach conditions of **.

[Claim 3] The manuscript reader characterized by including adjustment by the manual in focus adjustment conditions further in claim 2.

[Claim 4] The manuscript reader characterized by making into the criteria location of immobilization the location which performs focus adjustment, detecting it automatically in respect of a manuscript on the conditions from which two or more selectable adjustment modes differ, or including the focus adjustment position conditions of ** in claim 1 thru/or claim 3.

[Claim 5] The manuscript reader characterized by containing what made into the location which specified beforehand the location which performs focus adjustment further as focus adjustment position conditions in claim 4.

[Claim 6] Two or more optical units which are optical units for carrying out image formation of the image of a manuscript to the light source which irradiates a manuscript, and correspond to two or more different resolution, The resolution change control means which moves selectively one optical unit corresponding to the resolution as which it was instructed in these two or more optical units into an optical path, It is the manuscript reader which is equipped with a focus adjustment means to control the optical system containing an optical unit and to adjust a focus, and is characterized by the above-mentioned focus adjustment means having two or more selectable adjustment modes in which a different method performs focus adjustment.

[Claim 7] It is the manuscript reader which a focus adjustment means has an adjustment mode selection means to choose adjustment mode as behind, in claim 6 before directing initiation of manuscript read, and is characterized by performing focus adjustment with the selected adjustment mode.

[Claim 8] It is the manuscript reader characterized by being that to which one of the adjustment modes performs focus adjustment in claim 6 or claim 7 in the datum level of equipment.

[Claim 9] It is the manuscript reader which one of the adjustment modes detects beforehand the location which performs focus adjustment in a manuscript in claim 6 or claim 7, and is characterized by being what performs focus adjustment in the detected location.

[Claim 10] One of the adjustment modes is a manuscript reader characterized by being what performs focus adjustment in the location where the detection location of a manuscript or arbitration was directed in claim 6 or claim 7.

[Claim 11] It is the manuscript reader characterized by having a datum-level focus directions means to direct focus adjustment in the datum level of this equipment in order

to perform focus adjustment by the amendment function in which a focus adjustment means performs focus adjustment in claim 8 in the datum level of equipment.

[Claim 12] It is the manuscript reader characterized by having a datum-level focus adjustment value maintenance means to hold the focus adjustment value of the equipment datum level called for beforehand in order to perform focus adjustment by the amendment function in which a focus adjustment means performs focus adjustment in claim 8 in the datum level of equipment.

[Claim 13] A focus adjustment means is a manuscript reader characterized by having a focus-among manuscript adjustment position directions means to direct the focus adjustment position in a manuscript in order to perform focus adjustment by the adjustment mode in which focus adjustment is performed in the location where arbitration was directed in claim 10.

[Claim 14] It is the manuscript reader which one of the adjustment modes has an adjustment value directions means to direct the adjustment value for the focus of an optical unit, in claim 6 or claim 7, and is characterized by being what performs focus adjustment of an optical unit with the this directed adjustment value.

[Claim 15] It is the manuscript reader one of the adjustment modes has a focus adjustment value maintenance means to hold the focus adjustment value calculated by former manuscript read, and a focus adjustment means to direct focus adjustment using the this held focus adjustment value, in claim 6 or claim 7, and carry out that it is the thing carry out focus adjustment by the this directed focus adjustment value as the description.

[Claim 16] The manuscript reader characterized by performing manuscript read immediately after focus adjusting in equipment datum level in claim 8.

[Claim 17] The manuscript reader which detects the location for performing focus adjustment in a manuscript after focus adjusting in equipment datum level, and is characterized by performing manuscript read in claim 8 after performing focus adjustment in the this detected location.

[Claim 18] The manuscript reader characterized by performing focus adjustment in claim 8 in the location where it was directed in [after focus adjusting in equipment datum level] the manuscript, and performing read of a manuscript after that.

[Claim 19] The manuscript reader characterized by performing focus adjustment in claim 12 using the focus adjustment value of the held equipment datum level, and performing read of a manuscript after that.

[Claim 20] The manuscript reader which detects the location which performs focus adjustment in a manuscript, and is characterized by performing focus adjustment using the focus adjustment value in the equipment datum level currently held, and performing read of a manuscript after that in the this detected location in claim 12.

[Claim 21] The manuscript reader characterized by performing focus adjustment in the location where it was directed in the manuscript in claim 12 using the focus adjustment value in the equipment datum level currently held, and performing read of a manuscript after that.

[Claim 22] The manuscript reader which detects the location which performs focus adjustment with the focus adjustment value calculated by the read before holding in claim 15, and then performs focus adjustment in a manuscript, and is characterized by performing focus adjustment further in the this detected location, and performing read of

a manuscript after that.

[Claim 23] The manuscript reader characterized by for the focus adjustment value calculated by the read before holding in claim 15 performing focus adjustment, performing focus adjustment in the location where it was directed in the manuscript next, and performing read of a manuscript after that.

[Claim 24] The manuscript reader characterized by performing read of a manuscript after the focus adjustment value calculated by the read before holding in claim 15 performs focus adjustment.